Delta Smelt Captive Rearing Update

US Fish and Wildlife Service

California and Nevada Region

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ISSUE

Delta smelt have been in a state of decline since listing and current population indexes are at or near all-time lows. Such low indexes, combined with the fact that delta smelt are essentially annual fish that die after spawning, present the possibility that delta smelt could go extinct in the wild before efforts to restore the Delta can produce an environment favorable to recovery. The current state of the delta smelt population has led the Service to the concept of maintaining a genetic refugial population representative of the wild population for two specific purposes:

1) Ensure there are fish available for restoration should the population in the wild go extinct; and
2) Provide a source of fish for supplementation of wild populations should supplementation become a desired recovery action

All collection of wild fish for research purposes was halted in 2007. Approximately 600 delta smelt were captured in 2006 and remain in captivity at the UC Davis Fish Conservation and Culture Lab (FCCL), located at the state pumping facility in Byron. Barring additional collection of wild fish for recovery purposes, this population of captive wild fish will be propagated to initiate a genetic refugial population.

Much information necessary to establish a genetic refugia still needs to be developed. This includes information regarding:

- Whether the wild population of delta smelt is one homogeneous population or several genetically distinct populations
- Estimates of historic and current abundance
- Genetic variability within the wild population

Given the current state of knowledge, maintaining a genetic refugial population without loss of genetic variability within the population(s) will require maintaining 100-250 family groups.

CURRENT STATUS

The Service and FCCL are cooperating on the development of a genetic refugial population. Accomplishments to date include:

- Development of a breeding plan to guide the use of the remaining captive wild fish

- Funding of genetic studies to determine the genetic composition of wild populations
- Facility upgrades at FCCL and Livingston Stone National Fish Hatchery

FISH CONSERVATION AND CULTURE LAB - The FCCL facility at Byron has been largely funded by the CA Dept of Water Resources (DWR). The FCCL has the experience to reliably culture delta smelt. The current facility is geared toward production of cultured fish for research. To undertake the additional responsibility of development and maintenance of a genetic refugial population, DWR has dedicated approximately $1.5M to expand the facility and fund staff increases and the State Water Board approved $600Kfor this effort. With the expansion, the FCCL is currently planning to actuate 200-250 single pair crosses in 2008, and combine single family groups into multi-family groups as necessary. FCCL will rear over 50,000 fish per year.

LIVINGSTON STONE NATIONAL FISH HATCHERY (LS) - During 2006-2007, operating temporarily out of salmon culture facilities, LS demonstrated the ability to transport sub-adult fish and maintain them through spawning. LS was also able to successfully spawn fish, but had limited success in rearing fry. The Service has completed construction of a small facility dedicated to culture of delta smelt. When fully operational, this facility will be capable of holding 25-30 family pairs and producing 25,000-30,000 fish.

FUTURE PLANS

FISH CONSERVATION AND CULTURE LAB - To facilitate developing a refugial population with the remaining captive wild fish, the FCCL is expanding into one half of the DWR Collection, Handling, Transportation, and Release (CHTR) Building at the state pumping facility in Byron. Work will be initiated at both the existing FCCL and the CHTR building through 2008 until operations can be consolidated to the new refuge site (CHTR building). The $2.1M expansion, funded by DWR, will allow the FCCL to maintain a refugial population of about 200-250 single pair crosses to maximize use of the wild fish. Occupation of half the CHTR Building is only guaranteed for 2 years, after which the CHTR Building may be needed for other fish studies associated with operation of the state pumps.

To extend operation of the genetic refugial population at FCCL, one of three things will be necessary:

- Permission to extend operations and expand into the full CHTR building
- Construct another building on site. Estimates are $2 million for a new building capable of holding up to 200 single pair crosses
- Redirect focus of research at the FCCL to support continued development of the refugial population.

LIVINGSTON STONE NATIONAL FISH HATCHERY – In January, LS received approximately 200 captive-reared delta smelt from the FCCL to continue working toward closing the life-cycle for delta smelt culture. In addition, LS will serve as a back-up

facility to receive and maintain a sample of the genetic refugial population as insurance against catastrophe at FCCL. Once LS has demonstrated the ability to reliably spawn and rear delta smelt, LS will be integrated into the refugial population breeding plan, with a potential to hold 25-30 family groups.

NEW SERVICE HATCHERY - Even with a new building at Byron and LS operating at full capacity, a genetic refugial population at the two facilities would be less than the minimum of number family groups estimated as necessary to prevent loss of genetic diversity. This does not take into account any future conservation actions for other species, such as longfin smelt, green sturgeon, or Sacramento perch. For this reason, the Service is making plans for construction of a new facility capable of addressing conservation needs of delta smelt plus two additional species. Estimates for such a facility are $15-20 million. This facility would serve as the home of a genetic refugial population of 100-250 family groups, along with providing the ability to produce 250,000-500,000 delta smelt for supplementation of the wild population. The Service is looking into three sites: Rio Vista, Rough and Ready Island, and the federal pumping facility in Tracy to house this facility.

TIMELINE

Near-Term (1-2 years):

- FCCL maintains a genetic refugial population of 100-200 single pair crosses in CHTR Building and existing FCCL facility.
- LS develops capability to propagate delta smelt and maintains back-up population.
- Service works to select site and permit new facility.

Mid-Term (3-4 years):

- FCCL maintains 100 single pair crosses in half CHTR Building, expands operations to 200 single pair crosses in full CHTR Building (does not include the existing FCCL facility), or builds new facility to maintain the 200 single pair crosses.
- LS begins refugial operations, maintaining 25-30 family groups.
- Service begins construction of new facility.

Long-Term (4-5 years):

- FCCL returns to research operations, possibly maintaining back-up refugial population
- LS ceases refugial operations, possibly maintains back-up refugial population
- Service begins maintaining full refugial population in new facility.